

What Is Claimed Is:

1. A frame synchronization device, which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, first and second synchronization data for establishing frame synchronization and check data for correcting errors of data in the frame, said first and second synchronization data being disposed at prescribed positions within the frame, comprising:

a first frame synchronization unit for attempting to detect said first synchronization data within said received data in a frame hunting state in which frame synchronization is not established, and entering a synchronous state in which frame synchronization is established when said first synchronization data is detected in said prescribed position for a first predetermined number of consecutive frames;

an error correction unit for correcting errors of data in the frame based on said check data in the frame when said first synchronization data is detected by said first frame synchronization unit; and

a second frame synchronization unit for attempting to detect said second synchronization data at said prescribed position within the frame corrected by said error correction unit, and returning said first synchronization

unit to said frame hunting state when said second synchronization data is not detected.

2. The frame synchronization device according to  
5 Claim 1, wherein said second frame synchronization unit changes said first frame synchronization unit to the synchronous state when the number of said second synchronization data detected consecutively is equal to or greater than a second predetermined number.

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3. The frame synchronization device according to  
Claim 1, wherein:

said first frame synchronization unit attempts to detect said first synchronization data at the prescribed  
15 position of the received frame in the synchronous state, and enters the frame hunting state when the first synchronization data is not detected for a third predetermined number of consecutive frames; and

said second frame synchronization unit attempts to  
20 detect said second synchronization data at the prescribed position in the received frame corrected by said error correction unit, and puts said first synchronization unit into said frame hunting state when a fourth predetermined number of said second synchronization data is/are not  
25 detected consecutively.

4. A frame synchronization device, which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, first and second synchronization data for 5 establishing frame synchronization and check data for correcting errors of data in the frame, said first and second synchronization data being disposed at prescribed positions within the frame, comprising:

a first frame synchronization unit for attempting to 10 detect said first synchronization data at said prescribed position in said received frame in a synchronous state in which frame synchronization is established, and entering an asynchronous state in which frame synchronization is not established when said first synchronization data is not 15 detected for a first predetermined number of consecutive frames;

an error correction unit for correcting code errors of data in said received frame based on said check data in the frame; and,

20 a second frame synchronization unit for attempting to detect said second synchronization data at said prescribed position in the frame corrected by said error correction unit, and putting said first synchronization unit into said asynchronous state when a second predetermined number of 25 said second synchronization data is/are not detected consecutively.

5. The frame synchronization device according to  
Claim 1, wherein

said frame has an overhead portion containing control  
data and an information portion containing user data, and

5 said first synchronization data is positioned in said  
overhead portion, and one or more of said second  
synchronization data are positioned in said information  
portion.

10 6. The frame synchronization device according to  
Claim 1, wherein

said frame has an overhead portion containing control  
data, and

15 said first and second synchronization data are  
positioned at different positions in said overhead portion.

7. A frame synchronization device, which receives  
data communicated on a transmission line and establishes  
frame synchronization by means of frames containing, at  
20 least, a synchronization data for establishing frame  
synchronization and check data for correcting errors of  
data in the frame, said synchronization data being disposed  
at a prescribed position within the frame, comprising:

a first frame synchronization unit for attempting to  
25 detect said synchronization data within said received data  
in a frame hunting state in which frame synchronization is  
not established, and entering a synchronous state in which

frame synchronization is established when said synchronization data is detected at said prescribed position for a first predetermined number of consecutive frames;

5       an error correction unit for correcting errors of data in the frame having the detected synchronization data based on said check data in the frame if said synchronization data is detected by said first frame synchronization unit; and

10      a second frame synchronization unit for attempting to detect said synchronization data at said prescribed position in the frame corrected by said error correction unit, and returning said first synchronization unit to said frame hunting state if said synchronization data is not  
15 detected.

8.     The frame synchronization device according to  
Claim 7, wherein

      said first frame synchronization unit attempts, in  
20 said synchronous state, to detect said synchronization data at said prescribed position of said received frame, and, when said synchronization data is not detected for a second predetermined number of consecutive frames, enters said frame hunting state; and,

25      said second frame synchronization unit attempts to detect said synchronization data at said prescribed position in the frame after correction of said received

frame by said error correction unit, and, when said synchronization data is not detected for a third predetermined number of consecutive frames, puts said first synchronization data unit into said frame hunting state.

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9. A frame synchronization device, which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, a synchronization data for establishing frame synchronization and check data for correcting errors of data in the frame, said synchronization data being disposed at a prescribed position within the frame, comprising:

10 a first frame synchronization unit for attempting to detect said synchronization data at said prescribed 15 position of said received frame in a synchronous state in which frame synchronization is established, and entering an asynchronous state in which frame synchronization is not established when said synchronization data is not detected for a predetermined number of consecutive frames;

20 an error correction unit for correcting errors of data in said received frame based on said check data in the frame; and

25 a second frame synchronization unit for attempting to detect said synchronization data at said prescribed position in the frame corrected by said error correction unit, and putting said first synchronization unit into said asynchronous state when said synchronization data is not

detected for said predetermined number of consecutive frames.

10. A frame synchronization method, performed by  
5 reception device which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, first and second synchronization data for establishing frame synchronization and check data for correcting errors of data in the frame,  
10 said first and second synchronization data being disposed at prescribed positions within the frame, comprising steps of:

attempting to detect said first synchronization data in said received data in a frame hunting state in which  
15 frame synchronization is not established, and entering a synchronous state in which frame synchronization is established when said first synchronization data is detected at said prescribed position for a first predetermined number of consecutive frames;

20 correcting errors of the data in the frame having said detected first synchronization data based on said check data in the frame; and

attempting to detect said second synchronization data at said prescribed position in said corrected frame, and  
25 returning to said frame hunting state when said second synchronization data is not detected.

11. A frame synchronization method, performed by reception device, which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, first and second synchronization data for establishing frame synchronization and check data for correcting errors of data in the frame, said first and second synchronization data being disposed at prescribed positions within the frame, comprising steps of:
- 10        attempting to detect said first synchronization data at said prescribed position in said received frame in a synchronous state in which frame synchronization is established, and entering asynchronous state in which frame synchronization is not established when said first synchronization data is not detected for a first predetermined number of consecutive frames;
- 15        correcting errors of the data in said received frame based on said check data in the frame; and
- 20        attempting to detect said second synchronization data at said prescribed position in said corrected frame, and entering said asynchronous state when said second synchronization data is not detected for a second number of consecutive frames.
- 25        12. A frame synchronization method, performed by reception device which receives data communicated on a transmission line and establishes frame synchronization by

means of frames containing, at least, a synchronization data for establishing frame synchronization and check data for correcting errors of data in the frame, said synchronization data being disposed at a prescribed

5 position within the frame, comprising steps of:

attempting to detect said synchronization data within said received data in a frame hunting state in which frame synchronization is not established, and entering a synchronous state in which frame synchronization is

10 established when said synchronization data is detected at said prescribed position for a first predetermined number of consecutive frames;

correcting errors of the data in the frame having said detected synchronization data based on said check data in

15 the frame when said synchronization data is detected; and

attempting to detect said synchronization data at said prescribed position in said corrected frame, and, returning to said frame hunting state when said synchronization data is not detected.

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13. A frame synchronization method, performed by reception device which receives data communicated on a transmission line and establishes frame synchronization by means of frames containing, at least, a synchronization

25 data for establishing frame synchronization and check data for correcting errors of data in the frame, said

synchronization data being disposed at a prescribed position within the frame, comprising steps of:

- attempting to detect said synchronization data at said prescribed position in said received frame in a synchronous state in which frame synchronization is established, and entering an asynchronous state in which frame synchronization is not established when said synchronization data is not detected for a predetermined number of consecutive frames;
- correcting errors of the data in said received frame based on said check data in the frame; and
- attempting to detect said synchronization data at said prescribed position in said corrected frame, and entering said asynchronous state when said synchronization data is not detected for said predetermined number of consecutive frames.